Crops, Soils and Fertilizers

CONDUCTED BY B. W. KILGORE,
State Chemist North Carolina Department of Agriculture and Director Agricultural Experiment Station.

Inquiries of Progressive Farmer readers cheerfully answered.

FUNGICIDES AND SPRAYING.

I.—The Bordeaux Mixture.

Editors Progressive Farmer:

The efficiency of fungicides depends upon the fact that many plant diseases are caused by fungi. These fungi gain entrance to the plant at the surface by the means of reproductive bodies called spores. The fungicide is a mixture which is spread upon the surface of the plant and by its poisonous properties prevents the spores from successfully germinating and gaining entrance into the plant. These mixtures have been in use only during the last quarter of the last century. Notwithstanding their recent discovery and introduction they have made rapid headway in gaining a permanent place as a necessary means of crop protection. Their efficiency is recognized by all who grow for profit fruits, or other susceptible plants, and by all lovers of perfect fruit and healthy plants. Spraying for fungus diseases is recognized as a necessary measure by the successful horticulturist.

The Bordeaux mixture, which takes its name from its place of discovery, Bordeaux in France, is the most widely used and, with certain limitations, the most effective fungicide. It consists of copper sulphate (blue vitrial or blue stone) and quick lime mixed with water in various proportions. The Bordeaux mixture first used contained 18 pounds of copper sulphate, 34 pounds of lime, and 28 gallons of water. This constituted a pasty mass. Profiting from experience this was quickly superseded by weaker solutions. The first of these contained six pounds of copper sulphate, four pounds of lime and twenty-two gallons of water, which may be called in brief a 6-4-22 mixture. This was superseded by 6-4-45, while to-day we find recommended 6-4-60, 5-5-50, and 4-4-50 for common use, weaker strengths to be used in special cases. There is no certainty as to which of these strengths is best. No damage can come from the use of as strong solution as 5-5-50, yet it is possible that all the good can be accomplished by the 4-4-50. If so, there would be a loss of material through the use of the stronger solution. This matter is open to experimentation.

The two strengths of Bordeaux are as follows:

Copper sulphate or blue stone	4 lbs.
Quick lime	4 lbs.
Water	50 gallons.

This strength may be used on all plants of which the foliage is not susceptible to injury.

Those plants with delicate foliage, such as the peach, plum, cherry, and apricot, demand weaker solutions, consisting of

Copper sulphate	2 lbs.
Lime	2 lbs.
Water	50 gallons.
—Or—	
Copper sulphate	2½ lbs.
Lime	6 lbs.
Water	50 gallons.

In the preparation of the Bordeaux mixture it is well to have on hand stock solutions of copper sulphate and lime. The stock solution of the copper sulphate should be made by dissolving a certain number of pounds of copper sulphate in one-half the number of gallons of water, e. g., 80 pounds of copper sulphate in 40 gallons of water. Every gallon of this stock solution will contain two pounds of copper sulphate, and the necessity of weighing is avoided. The stock solution will remain good for any length of time if protected from evaporation, or if any water evaporated is replaced. In order to dissolve the copper sulphate it is best to tie it in a coarse bag and suspend it near the top of the liquid. In this way it will disolve in a few hours. If it is placed in the bottom of the barrel it will dissolve but slowly, even with constant stirring. It is well to dissolve the copper sulphate the night before you are ready to make the mixture, and it will then be ready in the morning.

In a similar way a stock solution of lime should be made. Quick lime of good quality, which is not at all slaked, should be weighed out and placed in a trough and slaked slowly, using a very small quantity of water. By slaking slowly in this way a finer quality of lime is secured. After the lime is thoroughly slaked it should be mixed with enough water to make a putty-like mass. This may be covered with more water to keep out the air, and may be used when needed. Since this mass was originally weighed you can estimate nearly enough the quantity for any given amount of Bordeaux mixture.

In preparing the Bordeaux mixture from stock, measure out the proper amount of stock solution of copper sulphate and dilute it with half the amount of water needed. In a similar way measure out the proper amount of lime needed from the stock and dilute it with the other half of the water, in a separate vessel. The lime should be passed through a fine wire strainer af about thirty meshes to the inch, or through cheese cloth, in order to remove the particles of stone, or it will otherwise cause great difficulty in the pump nozzle when spraying. We now have the two ingredients each mixed with one-half the amount of water called for in the formula. All that remains is to mix these two solutions. They should be poured together, slowly, and with stirring. It is a matter of considerable importance that the stock solutions be diluted before they are mixed with each other. The quality of Bordeaux mixture resulting from this method is superior in several respects to that which would be made if strong solutions were mixed together and afterwards diluted. The Bordeaux should be made fresh each time before using, and any that is left over should be thrown away.

F. L. STEVENS.

A. & M. College, West Raleigh.

GROWING OATS PROFITABLY.

Record of Results at the Georgia Experiment Station —The "Open Furrow" Method of Sowing Advised.

Editors Progressive Farmer:

Fall-sown oats, one year with another, all chances taken, will double the yield of spring-sown, on the same land. An experience of ten years on the Station Farm, preceded by more than twenty years' experience on his own farm, justifies the writer in saying that oats should be sown in Georgia in October and November, according to latitude. The first week in October, and even the last week in September in some cases, would not be too early in North Georgia, or in the mountains. Throughout the month of October is the time for the section known as Middle Georgia (later the farther south). November is the month for sowing in the southern half of the State.

The rule of sowing in the "twelve days" following Christmas day never had any basis in sound reason, and it is believed to be about the most inauspicious time that could be hit upon, it being generally the very coldest period of the winter.

The established practice on the Station Farm is as follows: Sow the larger part of the area intended for oats (on the farm 14 to 16 acres) in October, using Appler seed oats, and always saving enough of this variety to sow not less than two or three acres in the spring. If the fall-sown come safely through the winter, the remaining two acres are sown in Burt ("90-day oats") after February 15th. If the fall crop shall have been killed, which has occurred twice in ten years, the same land is sown in Burt oats, and the two or three acres only sown Appler in order to get in seed again. Enough seed of the Burt variety to sow the entire area is always reserved until no longer needed.

HOW TO SOW—"OPEN FURROWS."

During the years 1890 to 1895 the station found that oats sown in drills 18 to 24 inches apart invariably gave a larger yield than when sown broadcast and plowed or harrowed in. In itself this was an important result of experiments to that end. But a more important discovery is the fact that when the seed are sown in open furrows and barely covered, leaving the furrows open or unfilled, the oat plants are very much less liable to be killed by a severe freeze. The idea was conceived several years ago, and annually since we have sown the larger portion the fall-sown area in drills 18 to 24 inches apart, latterly using a Gantt fertilizer distributor. This sows but one row at a time, has no covering attachment, but simply opens a small furrow and sows the seed, the single wheel following in the furrow and barely covering the seed. The result is the plants come up one and a half to two inches below the general surface, and the "crown" of each plant is formed and establis[h] say two to two and a half inches below the general surface. The winter rains, light freezes and thaws, gradually, but only partly, fill in the open furrow, and the more vital and sensitive p[arts] of the plants are left at the original depths, below the reach of even very severe freezes.

The long anticipated freeze at last came and our theory was put to a crucial test. On February 8, 1899, the thermometer sank to fifteen degrees, followed on successive mornings by 19 and 17 degrees. On the 12th, it was down to eleven degrees, and on the morning of the 13th it stood at seven degrees below zero—the coldest day since February 8, 1835. The result was, fall-sown oats and January-sown oats were pretty generally destroyed everywhere. But our open furrow drilled oats, excepting two acres, stood the test remarkably well, and though seriously injured, made forty bushels to the acre.

In order to make more sure of the correctness of the preconceived theory that the open furrows would secure the oats from fatal freezing, on the one-acre sections that were sown in open furrows, in every alternate tenth of an acre the furrows were filled up flush by running over them with a clod-crusher and smoother. The result was that the oats on these alternate tenths were almost entirely destroyed, not one plant in ten surviving the severe freeze, and the plots were resown with the spring oats. But th[e] tenths, the furrows of which were left open, although severely injured, produced forty bushels of grain per acre, or more than half of the expected full crop.

When carefully drilled, one and a half to two bushels of oats are sufficient for an acre; when broadcasted, from three to four bushels of the same oats are required for one acre.

The foregoing is an extract from a bulletin issued by the Georgia Experiment Station in 1899.

Five years further experience since the foregoing was published, fully confirms the conclusions then reached. The following remarks may be added:

Sixteen inches apart is probably the best width between the oat furrows.

The oats may be sown in a cotton field, without further preparation than the previous clean culture of the cotton. In this case two furrows may be sown in each "middle."

In all cases the furrows should be laid on a level in order to secure best results.

The Gantt and the Carmical seed and fertilizer drills are now made with two spouts, one for the seed oats and one for the fertilizer, the oats being sown through the forward spout.

It has not been found necessary to use the covering attachment, the loose soil falling in immediately following the opening five-inch shovel (or short scooter) covering the oats sufficiently.

It somewhat facilitates the work of the harvester to run a weeder, or a light harrow, across the furrows in March or April.

The fertilizer formula advised is as follows per acre: Acid phosphate, high-grade, 22 pounds; muriate of potash, 50 pounds; cotton meal, 250 pounds—to be applied in the furrows at a time of sowing. In March or April apply 50 to 75 pounds of nitrate of soda as a top-dressing.

It has not been found that the above amount of cotton seed meal will injure the germinating principle of the seed. R. J. REDDING,
Director.

Georgia Experiment Station, Experiment, Ga.